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STRAWBERRY VARIETIES IN THE UNITED STATES



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THIS BULLETIN is intended as an aid to both commercial and amateur strawberry growers in the selection of varieties best suited to their needs and conditions. The information is based largely on the experience of successful growers in practically every important commercial strawberry-producing district throughout the country; but the results of experiment-station tests, the experience of commercial canners and byproduct manufacturers, the preferences of amateur fruit gardeners, and the conclusions resulting from wide personal observation have also been used in making up the variety lists which are given for different sections and regions. Varieties having particular value for different purposes are grouped under appropriate heads.

New varieties are being constantly introduced to the trade. Few of them possess special value as compared with others already more or less well known to the trade, and most of them soon disappear from the nurseryman's lists or at best remain of only local importance. But from time to time a new variety is introduced which has sufficient value to give it a somewhat permanent place in the strawberry industry, and as its merits become more and more widely known its planting is increased accordingly.

For these reasons no list of varieties recommended for planting in any section can be regarded as permanent; it is subject to change as valuable new introductions of little-known varieties of value come into prominence and their merits and range of adaptability become known.

STRAWBERRY VARIETIES IN THE UNITED STATES¹

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TESTING VARIETIES

THE TESTING of varieties of strawberries has long been carried on by private individuals, nurserymen, and experiment stations. Where such tests have been made on soils and under conditions typical of considerable areas they have been valuable. To be of greatest value, however, the tests must be continued for several years, because conditions vary from season to season and the strawberry responds quickly to changes in weather and soil. The varieties selected for extensive commercial growing should be those which, after several years' trial, show the best average record for productiveness and ability to meet commercial demands.

The recommendations made in this bulletin are based upon the experience of strawberry growers, nurserymen, and experiment-station workers throughout the country. Observations have also been made in important representative strawberry-growing regions and on breeding grounds and test plots at the time the berries were ripening, and the condition of the fruit on arrival in the larger markets has been studied.

¹For further information as to varieties of strawberries and their cultivation the reader is referred to the following Farmers' Bulletins: 901, Everbearing Strawberries. 1026, Strawberry Culture: South Atlantic and Gulf Coast Regions. 1027, Strawberry Culture: Western United States. 1028, Strawberry Culture: Eastern United States.

²The original edition of this bulletin was written by George M. Darrow.

ORIGIN OF CULTIVATED STRAWBERRIES

Modern strawberry varieties have been derived chiefly from two American species—the wild meadow strawberry of eastern North America (*Fragaria virginiana*) and the beach strawberry found along the beaches of the Pacific coast from Alaska to California and along the coast of Chile (*F. chiloensis*). The beach strawberry is also found on the mountains of the Hawaiian Islands. These two species were taken to Europe and hybridized there to produce the forerunners of the modern strawberry varieties.

Both wild species show many variations, and cultivated sorts show even more. Varieties are known that produce no runners; others have five leaflets to each leaf; and still others have fruit of various shapes, sizes, colors, and flavors. There are, however, no pure white cultivated varieties, though some are white with a slight pink color on one side. Neither is there a bush strawberry, though the old crowns of most varieties may become woody.

No fertile hybrids of the strawberry with other fruits have been produced. The so-called “strawberry-raspberry” is a raspberry species from Asia, and the strawberry bushes or trees are various plants that are not strawberries at all.

RELATION OF VARIETIES TO THE DEVELOPMENT OF THE INDUSTRY

Commercial strawberry growing began in the United States about 1800, the principal interest being in the vicinity of the four largest cities, Boston, New York, Philadelphia, and Baltimore. The industry remained largely in the vicinity of these cities until about 1860, when the growing of the Wilson variety, which originated in 1851, became general. During this period several varieties at one time or another were popular, the Large Early Scarlet being the principal one. Others, such as Early Hudson, Hudson's Bay, Crimson Cone, Red Wood, and Hovey, were also grown to some extent.

From 1860 to about 1885 the Wilson was the principal variety grown. With the introduction of this, a much better shipping variety than any previously known, commercial strawberry growing developed rapidly. As early as 1835 strawberry growing had reached commercial importance in the vicinity of Rochester, N. Y. In this region the Wilson first became generally grown, and until recent years it was grown there rather extensively for canning. With the introduction of the Wilson, strawberry growing in New Jersey first began to shift from the vicinity of New York to southern New Jersey. Following the Civil War, boat shipments of strawberries from the vicinity of Norfolk, Va., were sent to the New York market. At this time strawberry growing also began to develop rapidly in the Delaware and Maryland Peninsula, and southwestern Michigan and southern Illinois began supplying the Chicago market with strawberries.

The rapid extension of railroads and the introduction of refrigeration in transit led to the further extension of strawberry growing into Tennessee, central Arkansas, Louisiana, and northern Florida between 1870 and 1890. Since 1890 North Carolina, central Florida, Alabama, the Ozark area of Arkansas and Missouri, the Santa

Clara Valley of California, and the Pacific Northwest have become important strawberry-growing regions.

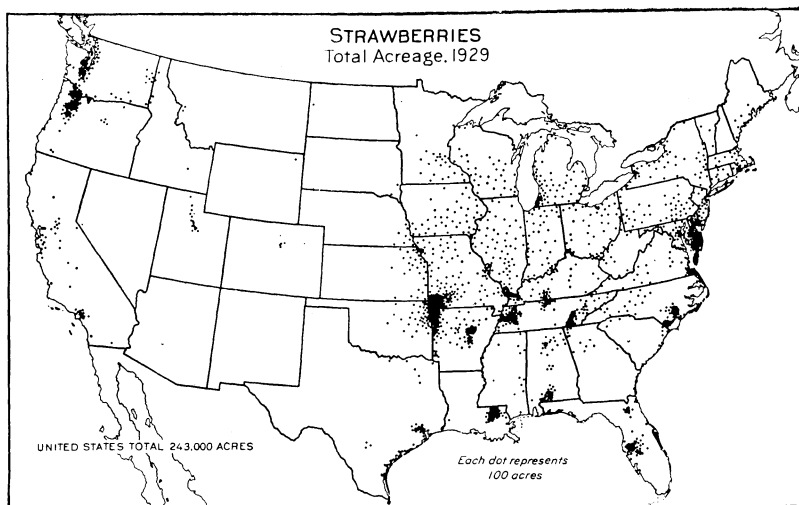


FIGURE 1.—Outline map of the United States showing the strawberry acreage in 1929.

The extent of the strawberry industry in the United States is shown in figures 1 and 2. Figure 1 is based on the census statistics of 1929 and includes the total acreage for home and local markets as well as for shipment to general markets. Figure 2 is based on com-

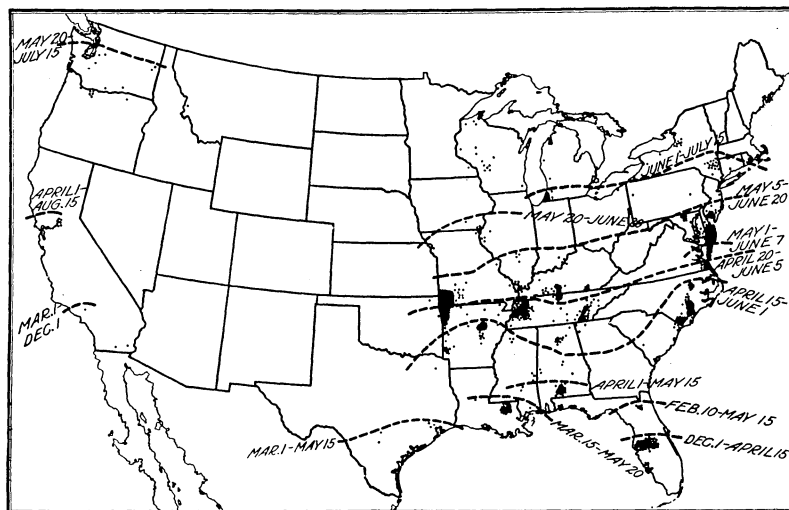


FIGURE 2.—Outline map of the United States showing the location of the principal commercial strawberry-producing sections, the approximate periods of ripening in each, and the progression of the strawberry season northward. (Data furnished by the Bureau of Agricultural Economics.)

mercial shipments and shows the average number of carloads shipped in three consecutive seasons and the large centers of commercial production.

EXTENSION OF RIPENING SEASON

Wild strawberries do not often supply ripe berries for more than 3 weeks, and until the Wilson berry was introduced this was the usual length of time that fruit could be obtained in any one market. This variety made it possible to ship berries from southern regions to the northern markets, and with the introduction of still firmer sorts it became possible to obtain strawberries in the larger markets from early in the winter, when berries are shipped from Florida, until July, when berries ripen in the extreme North.

Since the introduction of the Progressive in 1912 it has been possible to obtain locally grown berries in most northern markets continuously from June to October. This variety continues to blossom and produce fruit under favorable conditions throughout the growing season and is exceptionally hardy and resistant to disease.

VARIETIES IN DIFFERENT REGIONS

Since 1900 many varieties especially adapted to conditions in various parts of the country have been introduced. Thus, the Missionary is almost the only sort grown in Florida. It and the Blakemore are grown northward along the Atlantic coast to Norfolk, Va. The Klondike and Blakemore are the leading sorts in most other parts of the South; the Aroma in most of the milder parts of the Central States from southern Indiana, Illinois, and Missouri, south to northern Tennessee and northern Arkansas; the Dunlap in all of the Middle West north of the Aroma and Howard 17 sections; the Marshall (*Oregon*), Nich Ohmer, Ettersburg 121, Corvallis, Clark, Klondike, and Missionary in most parts of the Pacific Coast States; and the Howard 17 in the States north of the Ohio and Potomac Rivers and east of the Mississippi and between the Aroma and Dunlap sections west of the Mississippi.

Aside from the 11 varieties named above, few are grown extensively except in the Northeastern States. In that section, however, other sorts are grown, including the Chesapeake, Joe, Parsons, Belt (*William Belt*), Glen Mary, Heflin, Beaver, and Aberdeen. Most of these varieties, however, have been replaced to some extent by Howard 17. Where irrigation is used in the Northeastern States the Chesapeake is the principal variety planted.

Until the Dunlap, which was originated at Urbana, Ill., was introduced in 1900, the growing of strawberries in much of the northern Mississippi Valley was difficult and too uncertain to be profitable. Now, however, strawberries are grown in home gardens in nearly all of this region and for market throughout a large part of it. The Dunlap, which had been the leading variety grown in the North Central States, is very hardy and productive and in the Northern States very resistant to disease. In recent years Howard 17 has been grown extensively as far north as southern Minnesota but is not fully as hardy as Dunlap. Progressive, an everbearing sort, has been grown to some extent but is rapidly being replaced by Mastodon.

Although strawberries were introduced early and grown commercially in Florida, Louisiana, and Texas, south of the regions where the wild strawberry is found, the industry in the Southern

States has developed most rapidly since the introduction of varieties that have originated in that section. The Neunan, originating at Charleston, S. C., and introduced about 1868, began to replace Crescent and Wilson about 1870, though the latter were important commercial varieties up to 1890. The Cloud, originating near Independence, La., was much grown with Neunan as a pollinizer. The Hoffman, originating near Charleston, S. C., from seed of the Neunan, became the most important variety in many of the South Atlantic and Gulf States from 1890 to 1905. The Thompson (*Lady Thompson*), which originated at Mount Olive, N. C., prior to 1891 and came into prominence about 1898, and Michel (early), which originated in Arkansas in 1886 and came into prominence in 1897, were the leading commercial sorts in the South from that time until the Klondike and Missionary became well known. These two varieties for several years past were planted in the South for shipment almost to the exclusion of all others. The Klondike originated near Hammond, La., and was introduced in 1901. The Missionary was introduced in 1906, some 6 years subsequent to its origin in Norfolk County, Va. The Blakemore, introduced in 1929 by the United States Department of Agriculture, has already supplanted both varieties in a part of the Southern States from Maryland to Missouri southward to within 50 to 100 miles of the Gulf of Mexico.

ADAPTATION OF VARIETIES

In the United States about 30 varieties of strawberries are grown rather extensively. Many of these will doubtless be discarded upon further trial or when others of better quality and better adapted to particular conditions or uses have been introduced. Many of them are suitable for very restricted sections of the country and for particular conditions and uses in those sections. Others are more widely adapted and may be used for many purposes.

In addition to these 30 sorts, scores of others are raised to a slight extent, but most of them are inferior in productiveness, firmness, or some other characteristic of commercial importance.

ADAPTATION TO CLIMATE

The Missionary, Blakemore, and Klondike are adapted to the Southern States because they do not require a rest period during the winter but grow vigorously and form fruit buds during the short days of late fall, winter, and early spring. They also can endure the hot southern summers. The Missionary is the most southern, the Klondike next, and the Blakemore the more northern of these three sorts. The Blakemore does best with some cold in winter. Most northern varieties, however, seem to need a rest period during the winter and grow but little during the short winter days. They are adapted to a northern climate where they remain dormant during the winter, and flower and fruit during the long days of early summer. It is chiefly these three reasons—the need of or ability to do without a rest period, the response to long or short days and to hot or cool summers—that determine the regional adaptation of varieties.

The long dry summers of the Pacific coast hinder the development of leaf-spot diseases and make it possible to grow varieties

like the Marshall and the Redheart, which are susceptible to these diseases. There are other climatic conditions not fully understood that limit the growing of the western varieties in the East and eastern varieties in most of the West. As stated elsewhere (p. 4), the Dunlap, Progressive, and a few other sorts are hardy in the upper Mississippi Valley. Most varieties cannot withstand the cold, drying winters of that part of the country.

ADAPTATION TO LOCAL CONDITIONS

Besides the adaptation of varieties to the different sections of the United States on the basis of their need of or ability to thrive without a rest period, response to long or short days and to hot or cool summers, varieties in the Northeastern States have shown a striking adaptation to local conditions. This local adaptation of varieties is due largely to differences in the number and vigor of the plants in a given area of matted row. If the soil is fertile and moisture ample, varieties such as Blakemore and Dorsett, which express vigor of plant in the production of many runners, may make such a dense mat of plants that few fruits are produced. If, however, runners are removed from plants of the same varieties after a full stand of plants spaced 9 to 12 inches has rooted, extremely high yields may be obtained. Vigor of plant is then expressed in the formation of many crowns, many fruit buds, and much fruit. Local adaptation is the response of a variety to soil fertility, moisture supply, early or late planting, good or bad cultivation, etc. If the conditions are such as to produce a full stand of properly spaced, large, many-crowned plants by September 1, then the variety is well adapted locally. However, if even in the adjoining field, conditions are such as to result in a poor stand or in a dense stand of small plants, then the variety is not adapted to that field.

ADAPTATION TO SOIL

The soil requirements of the different varieties are important, though to a less degree than the climatic requirements. Certain varieties, like the Klondike, Howard 17, and Dunlap, are adapted to a very wide range of soils, while others, such as the Aroma, Gandy, Corvallis, and Ettersburg 121, are much more exacting. The Aroma seems best adapted to a fairly heavy soil, such as a heavy silt loam, but the Gandy, Corvallis, and Ettersburg 121 do best on a clay loam. The reason for these differences in soil adaptation seems to lie, in part at least, in the amount of moisture that the different sorts can get from the different soils through their roots, but even more to the number and size of runner plants produced on different soils. The root systems of different varieties, as shown in figure 3, differ greatly. By a careful study of soil types and the behavior of different varieties when grown in them, it is possible to select sorts adapted to most farm lands. Wherever the soil adaptations of the varieties are known they are included in the characterizations given on pages 24 to 29.

ADAPTATION TO SPECIAL CONDITIONS

Besides the varieties adapted to certain climatic and soil conditions there are others which are suited to certain special conditions, such as irrigation and intensive garden culture. Thus, the Chesapeake is the variety best liked by those growing strawberries under irrigation in the Northeast. This variety, which often fails to make a sufficient number of plants to produce profitable crops under non-irrigated conditions, makes an excellent stand and gives very large yields when irrigated. Likewise, the Marshall, Glen Mary, and some



FIGURE 3.—Bundles of strawberry plants of the Dunlap and Chesapeake varieties, showing the differences in the root systems of these varieties. Each bundle contains 27 plants of average size for the variety.

others, which do not yield satisfactorily under ordinary field treatment, produce very large crops when grown under intensive garden culture and when stable manure is applied.

Varieties that fruit well in certain localities may, nevertheless, be undesirable in those same locations. Thus, some late sorts will produce good crops in parts of the South, but because they ripen after the fruit grown farther north is supplying the markets they are unprofitable from the standpoint of the commercial grower. The more southern growers producing late berries cannot compete with those located much nearer the northern markets, to which the fruit is largely shipped. The sequence of the shipping period in

the different districts is shown in figure 2. Berries in Florida ripen during the winter, while farther north the ripening follows in succession. Each grower, therefore, must select varieties that ripen in his locality at a time when the markets to which he ships are not fully supplied from other districts more favorably situated than his for supplying the demand.

Persons growing berries for the home table and the local market should plant a variety of high quality which ripens through a long season, or several sorts ripening in succession. In the vicinity of Washington, D. C., for instance, the Dorsett or Fairfax may be grown to supply the local market. The Catskill is a good midseason sort in that locality, and it may be followed by the Gandy as a late-ripening sort.

Varieties especially adapted to canning and preserving are grown in many localities. Persons growing berries for such a trade should plant sorts that are very productive, hull easily, and retain their form, color, and flavor when canned. The Ettersburg 121, Corvallis,



FIGURE 4.—Staminate and pistillate flowers of the strawberry. At the left is a perfect or staminate flower, having both stamens and pistils. At the right is an imperfect flower, having pistils but no stamens. Plants of varieties having imperfect flowers must have plants of perfect-flowered sorts growing nearby in order to produce fruit, while the plants of a variety having perfect flowers will produce fruit even though no other sort is near.

Redheart, Wilson, Clark, Parsons, and others are used for canning and the Blakemore for preserving in the regions where they are grown.

PERFECT AND IMPERFECT FLOWERS

Strawberries produce two general types of flowers—imperfect or pistillate and perfect or staminate. Imperfect or pistillate flowers contain pistils but no stamens, while perfect or staminate flowers contain both pistils and stamens (fig. 4). Pollen, which is produced in the stamens, is essential to the setting of fruit. A variety with perfect flowers, therefore, can produce fruit when planted by itself, but one with imperfect flowers cannot set fruit unless perfect-flowering plants are nearby to furnish pollen through the agency of bees or other insects. Because of this, varieties having imperfect flowers are not so desirable as those having perfect flowers, and fewer of them are grown. However, some of the sorts having imperfect flowers, or “imperfect varieties” as they are commonly called, are

very productive and are liked in certain sections. Imperfect varieties also are injured less by the strawberry weevil than perfect sorts, since this insect feeds on pollen; and, in regions where it is serious, imperfect sorts are often grown in relatively large proportions. However, they form less than 5 percent of the total acreage devoted to strawberries in the United States, and their planting appears to be decreasing.

Where imperfect varieties are used the usual practice in planting is to set one row of a perfect variety for every 2 or 3 rows of an imperfect one. Figure 4 shows both types of flowers.

Certain sorts, the Glen Mary and the Progressive of the ones most commonly grown, under ordinary conditions produce flowers having both stamens and pistils, but frequently, under peculiar weather conditions, they produce so few good stamens that they do not have sufficient pollen to insure the setting of fruit. When these varieties do not set well, a variety producing an abundance of pollen should be planted with such sorts in the proportion that perfect varieties are usually planted with imperfect ones. Apparently, less pollination trouble is experienced with these sorts if they are grown on very fertile soil.

PARTIAL STERILITY OF PERFECT-FLOWERED VARIETIES

The flowers of pistillate-flowered varieties nearly always all set fruit when pollinated. The blossoms of perfect-flowered varieties, however, rarely all set fruit. Though rain, frost, disease, and insect injury may prevent the setting of some flowers, the most common and most important cause is the sterility of the pistils. These flowers with sterile pistils appear normal but set no fruit or only "nubbins." Under some conditions not 1 in 50 of the flowers of some varieties set. Thus the Ettersburg 121 variety, which is one of the most productive of all varieties on certain heavy soil types in Oregon, does not set 1 flower in 100 on sandy soils at Glenn Dale, Md., whereas adjacent pistillate-flowered sorts set all or nearly all their flowers.

The first flower to open on a flower cluster is more likely to set than the later ones, and the last ones to open are most often sterile. On an average about one-third of the blossoms of cultivated perfect-flowered varieties are sterile. Those varieties which set the largest percentage of their flowers in any locality should be selected. Figure 5 shows a fruit cluster of the White Sugar variety in which only the first two flowers to open have set; all the others are sterile. Figure 6 shows a fruit cluster of the Klondike variety in which all the flowers set. Early-formed runner plants and plants spaced well apart have many less sterile flowers than later-formed crowded plants.

FRUIT PRODUCTION AND GROWTH HABIT

Recent studies have shown that the value of varieties depends in a large part on their growth habit. One of the best types of growth for Eastern States is that shown by the Howard 17, Dunlap, and Parsons, which tend to produce irregular low-branching flower clusters with relatively large berries. When the soil on which these

varieties are grown is quite fertile their vigor is expressed in branch crowns and increased size of low-branching irregular flower clusters that bear many large berries. In contrast, the Missionary and Klondike varieties on sandy soil near Washington tend to produce small flower clusters which are high-branching, and when their vigor is increased they tend to produce more runner plants than branch crowns or large flower clusters. Farther south, however, the Missionary and Klondike tend to the growth habit represented by the Howard 17, Dunlap, and Parsons. A third growth habit is that illustrated by the Portia, a Canadian variety, when grown near Washington, D. C. When its vigor is increased its growth habit

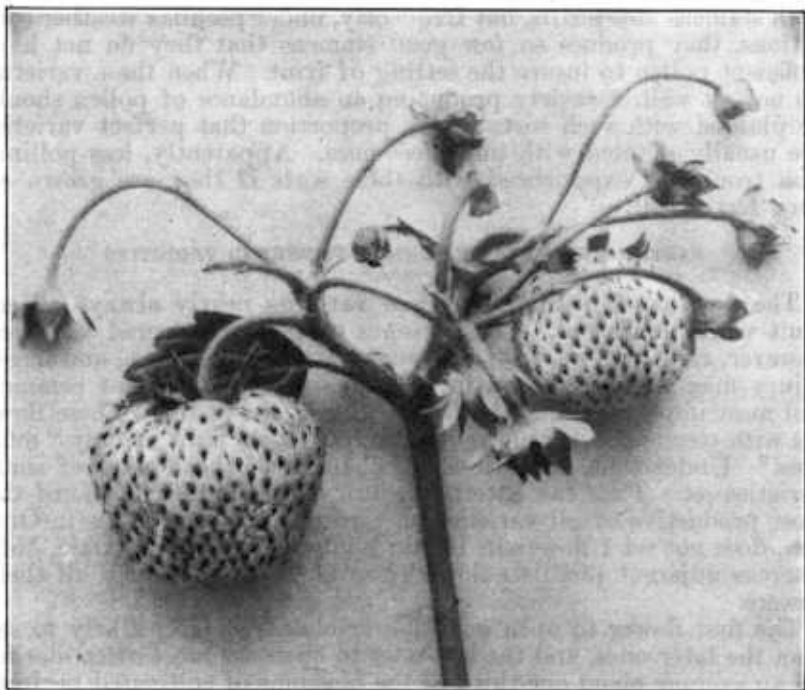


FIGURE 5.—A fruit cluster of the White Sugar variety in which only two of the flowers set fruit, the other flowers being sterile. In regions where as many of the blossoms are sterile as are shown here such a variety will hardly be profitable. All or nearly all perfect-flowered varieties show more or less sterility.

tends toward few branch crowns, larger high-branching flower clusters, and many small berries. Its growth near Washington represents a habit much less desirable than that of Howard 17.

VARIETIES FOR DIFFERENT STATES

For the purpose of obtaining information on the varieties best adapted to different regions, a large number of commercial growers in the important producing districts in all parts of the United States were requested to give the names of the leading sorts in their localities, together with information concerning the acreage, relative importance, and merits of each variety as grown under their conditions. In addition, personal visits have been made to nearly all

important commercial regions, and most of the State agricultural experiment stations have assisted in furnishing information on strawberry varieties. The lists given in table 1 have been compiled from information thus obtained.

HOW TO USE THE LIST OF VARIETIES

The lists in table 1 are arranged alphabetically by States and, under the States, by the districts in which strawberries are grown

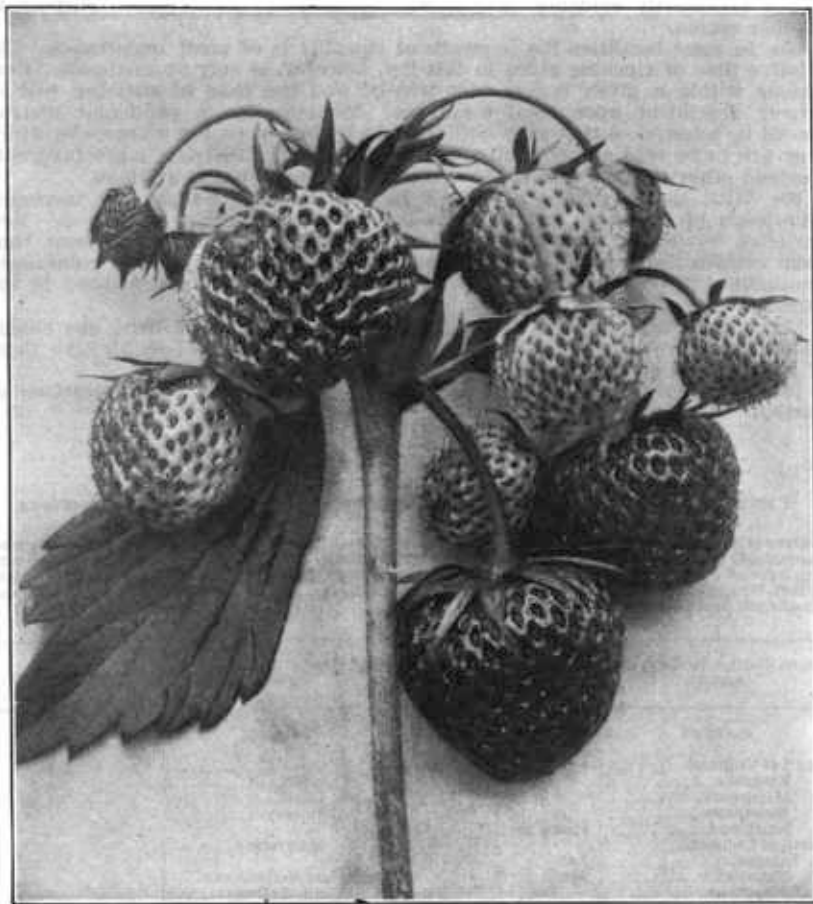


FIGURE 6.—A fruit cluster of the Klondike, a perfect-flowered variety, in which all the flowers set. Often, however, the Klondike does not set all its flowers.

commercially. The varieties are placed approximately in the order of their commercial importance in the different districts, and in the column headed "Season and use" the purpose for which each variety is especially adapted is given where particular merit is known to exist. In using the lists the following points should be kept in mind:

(1) The variety lists are suggestive only. Under certain local conditions other sorts may be fully as desirable as those named.

(2) In the Northeastern States several varieties having the same season of ripening are named. One's choice of varieties under these conditions should be guided by the experience of neighbors, so far as it can be used, and by the extent of runner restriction practiced.

(3) The listing of varieties for certain districts and for certain States should not be construed as evidence that conditions therein are necessarily favorable to the development of a commercial strawberry industry. On the other hand, many sections not named in the lists are well adapted to strawberry growing, those mentioned being simply those in which the principal development has taken place.

(4) The fact that a variety is adapted to a certain purpose in one region is not necessarily evidence that it will be adapted to a similar purpose in another region.

(5) In some localities the sequence of ripening is of great importance. The relative time of ripening given in this list, however, is only approximate. Conditions within a given region vary widely, and the time of ripening will be largely dependent upon local conditions. Varieties for a particular district should be selected so that they will ripen at a time when the markets in which they are to be sold are not fully supplied from other districts more favorably located; otherwise, an undesirable competition is inevitable at times.

(6) With the increase of interest in strawberry breeding and increased knowledge of the work, better sorts are continually being originated. New varieties worthy to replace some of the standard sorts of the present time have already been produced and may be expected to come into prominence gradually. It is probable that still better varieties will be developed in the future.

(7) In selecting varieties for a place not specified in the lists, one should choose sorts grown where the conditions are as nearly as possible like those of the place in question.

(8) The lists should be used in connection with the characterizations of varieties given on pages 24 to 29.

LIST OF VARIETIES BY STATES

TABLE 1.—*Lists of strawberry varieties arranged by States and sections*

[Names of imperfect varieties are followed by the abbreviation "imp." The lists show the varieties most commonly grown in the various regions. Those recommended for commercial planting are marked with an asterisk (*). Under "Season and use" the terms early, everbearer, medium late, midseason, late, short, throughout summer, etc., relate to the season of fruitage; the terms canning, desert, general use, home use, main crop, market, shipping, etc., show the purpose for which the variety is grown]

State, district, locality, and variety	Season and use	State, district, locality, and variety	Season and use
ALABAMA		ARIZONA	
South of Cullman:		Arizona.....	
Klondike.....		Klondike.....	
*Missionary.....		St. Louis.....	
*Blakemore.....		*Missionary.....	
Southland.....	Home use.		
North of Cullman:		CALIFORNIA	
*Aroma.....	Late.	Fresno and Sacramento:	
Klondike.....	Early.	*Marshall (<i>Oregon</i>).....	
*Blakemore.....	Do.	Los Angeles:	
Missionary.....	Do.	Brandywine.....	Throughout summer.
Southland.....	Home use.		Spring crop only.
ARKANSAS		*Klondike.....	Do.
North of Judsonia:		*Blakemore.....	Do.
*Klondike.....	Early.	*Missionary.....	Do.
*Blakemore.....	Do.	San Francisco:	
*Aroma.....	Late.	*Marshall (<i>Banner</i>).....	
Southland.....	Home use.	(<i>Oregon</i>).....	
South of Judsonia:		*Nich Ohmer.....	
*Klondike.....	Early.	Throughout the State:	
*Blakemore.....	Do.	North of Fresno:	
Southland.....	Home use.	*Marshall.....	
		*Nich Ohmer.....	

TABLE 1.—*Lists of strawberry varieties arranged by States and sections—Contd.*

State, district, locality, and variety	Season and use	State, district, locality, and variety	Season and use
CALIFORNIA—Continued		ILLINOIS—continued	
Throughout the State—Con.		Throughout the State—Con.	
South of Fresno:		Northern district—Con.	
*Brandywine.....	Dessert.	Dorsett.....	Trial.
*Klondike.....	Shipping.	Mastodon.....	Everbearer.
*Blakemore.....	Do.	Southern district:	
*Missionary.....	Do.	*Aroma.....	Medium late.
		*Blakemore.....	Early.
COLORADO		INDIANA	
*Dunlap.....	Early.	*Howard 17 (<i>Premier</i>).....	Very early.
*Jucunda.....	Late.	*Aroma.....	Shipping.
*Howard 17 (<i>Premier</i>).....	Early.	Gandy.....	Late.
CONNECTICUT		Mastodon.....	Everbearer.
*Howard 17.....	Very early.	Fairfax.....	Trial.
Fairfax.....	Early.	Dorsett.....	Do.
*Aberdeen.....	Midseason.	IOWA	
Glen Mary.....	Do.	Keokuk:	
Chesapeake.....	Late.	*Howard 17 (<i>Premier</i>).....	Early.
Sample.....	Do.	Dunlap.....	
Mastodon.....	Everbearer.	*Blakemore.....	Early.
Dorsett.....	Early.	Throughout the State:	
DELAWARE		*Dunlap.....	Trial.
*Blakemore.....	Early, preserving.	Dorsett.....	Do.
*Fairfax.....	Early.	Fairfax.....	
*Dorsett.....	Do.	Howard 17.....	
*Chesapeake.....	Late.	*Progressive.....	Everbearer.
Howard 17.....	Early.	Rockhill.....	Do.
*Lupton.....	Late.	KANSAS	
*Joe.....	Do.	Doniphan County:	
DISTRICT OF COLUMBIA		*Aroma.....	
Washington:		*Blakemore.....	Early.
*Blakemore.....	Early.	Howard 17.....	Do.
*Dorsett.....	Do.	Mastodon.....	Everbearer.
*Fairfax.....	Do.	Throughout the State:	
Howard 17.....	Do.	*Dunlap.....	Hardy.
*Gandy.....	Late.	*Aroma.....	Shipping.
*Chesapeake.....	Do.	*Howard 17.....	Early.
Joe.....	Do.	*Blakemore.....	Do.
Catskill.....	Midseason.	Fairfax.....	Trial.
		Dorsett.....	Do.
		Paul Jones.....	
FLORIDA		KENTUCKY	
*Missionary.....	Practically no other planted.	Bowling Green, Paducah, and Franklin:	
GEORGIA		*Aroma.....	
*Blakemore.....	Shipping.	Blakemore.....	
Southland.....	Home use.	Throughout the State:	
Missionary.....	Extreme south.	*Aroma.....	
Aroma.....	Extreme north, late.	*Howard 17 (<i>Premier</i>).....	Early.
		Blakemore.....	Do.
IDAHO		LOUISIANA	
*Superb.....	Everbearer.	Throughout the State:	
Rockhill.....	Do.	*Klondike.....	
Mastodon.....	Do.	Northern part:	
*Glen Mary.....	Local market.	Blakemore.....	Early.
Belt (<i>William Belt</i>).....	Do.	Southland.....	Home use.
Marshall.....	Do.	MAINE	
Dunlap.....	Do.	*Dunlap.....	Midseason.
ILLINOIS		*Howard 17.....	Very early.
Anna:		*Sample (imp.).....	Late.
*Klondike.....	Early.	Marshall.....	Special markets.
*Blakemore.....	Do.	*Progressive.....	Everbearer.
*Aroma.....	Medium late.	Belt (<i>William Belt</i>).....	
Throughout the State:		Parsons (<i>Gibson</i>).....	Midseason.
Northern district:		MARYLAND	
Dunlap.....		Eastern Shore:	
Howard 17 (<i>Premier</i>).....	Very early.	*Blakemore.....	Barreling, early.
Fairfax.....	Trial.	*Fairfax.....	Early.

TABLE 1.—*Lists of strawberry varieties arranged by States and sections—Contd.*

State, district, locality, and variety	Season and use	State, district, locality, and variety	Season and use
MARYLAND—continued		NEBRASKA	
Eastern Shore—Continued.		*Dunlap.....	Everbearer.
*Dorsett.....	Early.	Progressive.....	Do.
*Catskill.....	Midseason.	Mastodon.....	
*Chesapeake.....	Late.		
*Joe.....	Do.	NEVADA	
*Lupton.....	Do.	[Varieties grown in Utah and California should be tried]	
Gandy.....	Do.	NEW HAMPSHIRE	
Western section:		Dunlap.....	Midseason.
*Blakemore.....	Early.	*Howard 17.....	Very early.
*Howard 17.....	Very early.	Sample (imp.).....	Late.
*Fairfax.....	Early.	Progressive.....	Everbearer.
*Dorsett.....	Do.	Mastodon.....	Do.
*Catskill.....	Midseason.		
Gandy.....	Late.		
MASSACHUSETTS		NEW JERSEY	
Falmouth:		Southern district:	
*Howard 17.....	Early.	*Lupton.....	Late.
Blakemore.....		*Howard 17.....	Early.
Throughout the State:		*Chesapeake.....	Irrigated fields.
*Howard 17.....	Very early.	*Aberdeen.....	Midseason.
Sample (imp.).....	Late.	*Joe.....	Do.
Mastodon.....	Everbearer.	*Blakemore.....	Early.
Aberdeen.....	Midseason.	*Fairfax.....	Medium early.
Catskill.....	Do.	*Dorsett.....	Early.
Fairfax.....	Trial.	Northern district:	
MICHIGAN		*Howard 17.....	Early.
*Dunlap.....	Northern chiefly.	*Chesapeake.....	Late irrigated fields.
*Howard 17 (Premier).....	Very early.	*Joe.....	Late.
Parsons (Gibson).....	Midseason.	*Aberdeen.....	Midseason.
Progressive (Champion).....	Everbearer.		
Mastodon.....	Do.	NEW MEXICO	
Dorsett.....	Trial.	Dunlap.....	
MINNESOTA		Arizona.....	
Northern part:		Klondike.....	
*Dunlap.....		*Missionary.....	
*Progressive.....	Everbearer.		
Southern part:		NEW YORK	
*Howard 17 (Premier).....		Oswego:	
Minnehaha.....	Late.	Late Stevens.....	Late.
Rockhill.....	Everbearer.	Glen Mary.....	Midseason.
Mastodon.....	Do.	*Howard 17.....	Early.
*Beaver.....		Rochester:	
MISSISSIPPI		*Howard 17.....	Early.
Southern part:		Glen Mary.....	Midseason.
*Klondike.....		Erie and Chautauqua	
Missionary.....		Counties:	
Northern part:		*Clermont.....	Early.
*Blakemore.....		Parsons.....	Canning.
*Klondike.....		Highland and Milton:	
Southland.....	Home use.	*Belt (William Belt).....	Midseason.
MISSOURI		*Chesapeake.....	Late.
Ozark section:		*Joe.....	Do.
*Aroma.....	Late.	*Howard 17.....	Early.
*Blakemore.....	Early.	Throughout the State:	
Dorsett.....	Do.	*Howard 17.....	Very early.
Fairfax.....	Do.	Glen Mary.....	Midseason.
North of Missouri River:		Fairfax.....	Trial, early.
*Blakemore.....	Early.	Dorsett.....	Do.
Progressive.....	Everbearer.	*Parsons.....	Midseason.
Mastodon.....	Do.	Belt (William Belt).....	
*Howard 17 (Premier).....	Early.	Gandy.....	Late.
Dorsett.....	Trial.	Progressive.....	Everbearer.
Fairfax.....	Do.	Mastodon.....	Do.
MONTANA		NORTH CAROLINA	
*Dunlap.....		Chadbourn:	
*Progressive.....	Everbearer.	*Klondike.....	Early.
		Wallace district:	
		*Missionary.....	Early.
		Southland.....	Home use.
		*Blakemore.....	Early.

TABLE 1.—*Lists of strawberry varieties arranged by States and sections—Contd.*

State, district, locality, and variety	Season and use	State, district, locality, and variety	Season and use
NORTH CAROLINA—contd.		TENNESSEE	
Western part:		East Tennessee:	
*Howard 17.....		*Aroma.....	Late.
*Blakemore.....		*Missionary.....	Early.
Fairfax.....	Dessert.	*Klondike.....	Do.
Dorsett.....	Do.	*Blakemore.....	
Southland.....	Do.	Southland.....	Home use.
		Central Tennessee:	
NORTH DAKOTA		Howard 17.....	Early.
*Dunlap.....	Midseason.	*Blakemore.....	Do.
*Progressive.....	Everbearer.	*Aroma.....	Late.
Dakota.....	Very hardy.	West Tennessee:	
		*Klondike.....	Early.
OHIO		*Blakemore.....	Do.
		*Aroma.....	Late.
Southern district:		TEXAS	
*Howard 17.....	Early.	San Antonio section:	
*Aroma.....	Medium late.	*Klondike.....	
*Gandy.....	Late.	*Missionary.....	
Northern district:		Houston:	
*Howard 17.....	Very early.	*Missionary.....	Main crop.
Gandy.....	Late.	*Klondike.....	Do.
Parsons.....	Midseason.	Excelsior.....	Very early.
Chesapeake.....	Late.	Tyler:	
Progressive.....	Everbearer.	*Klondike.....	
Mastodon.....	Do.		
		UTAH	
OKLAHOMA		Chesapeake.....	Late.
*Klondike.....	Early.	*Marshall.....	Midseason.
*Aroma.....	Late.	Howard 17.....	Early.
*Blakemore.....	Early.		
		VERMONT	
OREGON		*Dunlap.....	Midseason.
Hood River:		*Howard 17.....	Very early.
*Clark.....	Shipping.	Sample (imp.).....	Late.
Willamette Valley:		Belt (<i>William Belt</i>).....	
*Narcissa.....	Early local market.	*Progressive.....	Everbearer.
*Marshall (<i>Oregon</i>).....	Midseason local market and barreling.		
*Ettersburg 121.....	On heavy soils; canning.	VIRGINIA	
	Do.	Western Virginia:	
*Corvallis.....	Do.	Howard 17.....	Early.
*Redheart.....	Canning.	Joe.....	Late.
*Rockhill.....	Everbearer.	Blakemore.....	Early.
		*Dorsett.....	Do.
PENNSYLVANIA		*Fairfax.....	Do.
*Howard 17.....	Very early.	Norfolk:	
*Joe.....	Late.	*Missionary.....	
Gandy.....	Do.	*Blakemore.....	
Catskill.....	Midseason.	Southland.....	Home use.
Chesapeake.....	Late.	Eastern Shore counties:	
Mastodon.....	Everbearer.	*Blakemore.....	Early.
Fairfax.....	Early.	*Heflin.....	Do.
Dorsett.....	Do.	*Joe.....	Late.
		Howard 17.....	
RHODE ISLAND		WASHINGTON	
*Howard 17.....	Very early.	White Salmon:	
Marshall.....	Special market.	*Clark.....	
Progressive.....	Everbearer.	Redheart.....	
Mastodon.....	Do.	Puget Sound section:	
		*Marshall.....	General use and barreling.
SOUTH CAROLINA		Narcissa.....	Early, local market.
*Missionary.....	Early.	Corvallis.....	On heavy soils; canning.
*Klondike.....	Do.	Redheart.....	Canning.
*Blakemore.....	Do.	Spokane:	
Southland.....	Home use.	Glen Mary.....	Market and barreling.
		Howard 17.....	Early.
SOUTH DAKOTA		Marshall.....	Market and barreling.
*Dunlap.....	Midseason.		
*Progressive.....	Everbearer.		

TABLE 1.—*Lists of strawberry varieties arranged by States and sections—Contd.*

State, district, locality, and variety	Season and use	State, district, locality, and variety	Season and use
WASHINGTON—continued		WISCONSIN	
Kennewick:		*Dunlap.....	
Clark.....		*Beaver.....	Light soils.
Blakemore.....		*Howard 17 (<i>Premier</i>).....	
Howard 17.....		*Progressive.....	Everbearer.
		Rockhill.....	Do.
WEST VIRGINIA		WYOMING	
Aroma.....	Late.	*Dunlap.....	
Gandy.....	Do.		
*Howard 17.....	Early.		
Joe.....	Late.		
Fairfax.....	Early, trial.		
Dorsett.....	Do.		

It will be noted from table 1 that only a comparatively small number of varieties are grown extensively in this country, while in some States only one sort is grown to any considerable extent. Many varieties listed, although important in some locality, are comparatively unimportant when the industry as a whole is considered. Such varieties do not usually remain in cultivation long, for nurserymen do not find them as profitable to propagate as the widely grown sorts. Furthermore, local varieties are not known by the trade so well as the standard sorts, and the fruit is not wanted by buyers unless of exceptionally good quality and grade. Therefore, under ordinary conditions, growers shipping to the general markets should raise only well-known varieties.

IMPORTANCE OF THE VARIETIES

In table 2 the varieties are listed in the order of their importance in the country on the basis of the acreage planted to each. The table gives the approximate percentage of the total acreage in the country devoted to each variety in 1934.

It should be noted that 19 sorts constituted about 96 percent of the total commercial strawberry acreage in the United States in 1934.

The first three sorts—Klondike, Aroma, and Howard 17—constituted 60 percent of the acreage. In 1919 the Howard 17 variety had been only recently introduced and was considered a promising new sort. Ten years later, it had become one of the three principal varieties in the country. It has largely replaced a number of minor varieties. This is a demonstration of the rapidity with which a variety of superior merit comes into popular favor. Nine of the varieties listed in table 2 are known to have originated as the result of definite work for the production of better varieties. These constituted over 70 percent of the total acreage in strawberries in the United States in 1934.

As indicated in the last item in table 2, "other varieties" make up 4 percent of the total acreage devoted to strawberries. This 4 percent is composed principally of 9 varieties, as follows: Late Stevens, Glen Mary, Corvallis, Ettersburg 121, Sample, Ridgely, Wilson, Clermont, and Progressive. There are many other varieties in the trade, but they are grown to such a limited extent as to be practically negligible as varieties from a commercial standpoint.

TABLE 2.—*The principal strawberry varieties in the United States in the order of their importance in 1934 on the basis of the estimated acreage of each*

Rank	Variety	Total acreage	Rank	Variety	Total acreage
		<i>Percent</i>			<i>Percent</i>
1	Klondike.....	30.0	12	Heflin.....	1.0
2	Aroma.....	16.0	13	Gandy.....	1.0
3	Howard 17 (<i>Premier</i>).....	14.0	14	Belt.....	.5
4	Missionary.....	8.0	15	Beaver.....	.5
5	Marshall (<i>Oregon</i>).....	7.0	16	Clark.....	.5
6	Blakemore.....	6.0	17	Mastodon.....	.5
7	Dunlap.....	4.0	18	Nick Ohmer.....	.5
8	Chesapeake.....	2.0			
9	Joe.....	2.0	19	Parsons (<i>Pocomoke, Gibson</i>).....	.5
10	Aberdeen.....	1.0		Other varieties.....	4.0
11	Lupton.....	1.0		Total.....	100.0

The maps shown as figures 7 and 8 outline the regions where the Klondike, Aroma, Dunlap, and certain other important varieties are principally grown. The regions thus outlined are approximate

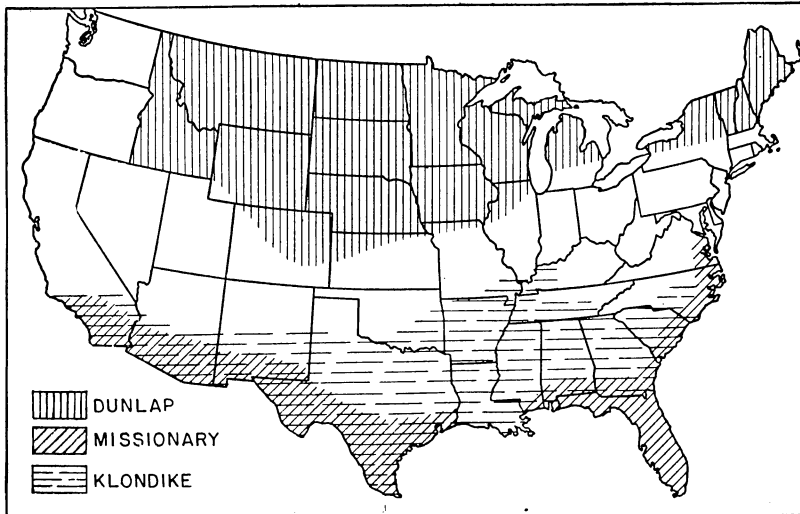


FIGURE 7.—Outline map of the United States, showing where the Dunlap, Klondike, and Missionary varieties of strawberries are profitably grown. The Missionary variety is grown in some sections other than those shown but is recommended only for the area indicated. The Blakemore is rapidly replacing Klondike and Missionary from 50 to 100 miles north of the Gulf of Mexico.

only, and probably exclude small areas where these varieties are raised. They show, however, the wide distribution of certain varieties, suggesting at the same time that many of them are adapted to wide variations in soil and climate.

VARIETIES FOR SPECIAL PURPOSES

Not all sorts are equally well suited to all purposes, and growers often use certain varieties for special markets. For home gardens, several sorts may be needed, ripening from early to late. In many

localities where large quantities of berries are barreled or canned, varieties especially adapted to this purpose are needed.

VARIETIES FOR CANNING

Varieties for the canning trade should be productive and should bear medium-sized firm-fleshed berries, separating readily from the calyx (hull or cap), deep red to the center, and brisk subacid to acid in flavor. Berries having a color that does not fade readily when canned make the most attractive product and are the most desirable.

Most canned strawberries are packed in Oregon and Washington, where the Ettersburg 121, Corvallis, and Redheart are extensively grown for this purpose. The Wilson is still used to a slight extent for canning in western Oregon and Washington. In fact, this variety is grown at present only because of its superior canning qualities. The Clark, grown in the Hood River Valley, is a fair canner. In

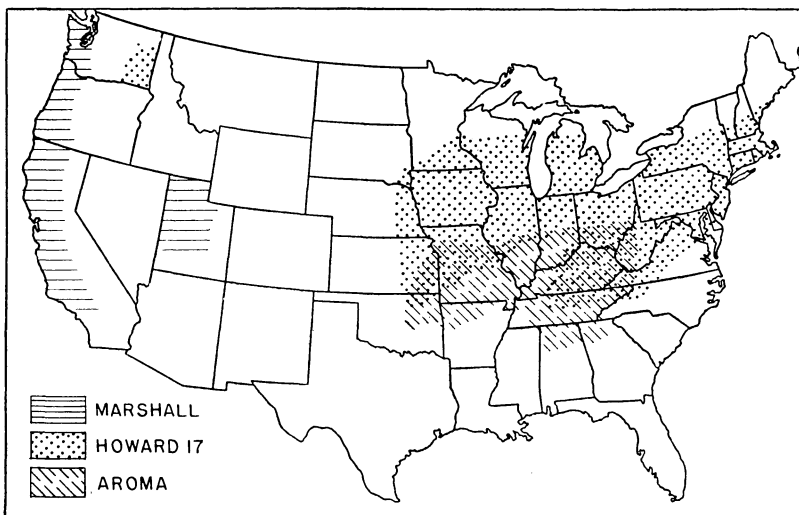


FIGURE 8.—Outline map of the United States, showing the areas where the Howard 17, Marshall, and Aroma varieties of strawberries are grown extensively.

some northern States the Parsons (*Pocomoke*, *Gibson*) is preferred. In the Middle West the Warfield and the Dunlap are used for this purpose.

VARIETIES FOR PRESERVING AND ICE CREAM

Varieties for preserving should be easy to cap, medium-sized, firm, and have a high flavor and a light, bright-red color that does not turn dark after preserving. For the ice-cream trade, varieties with a deep-red color and high flavor are desired. The best preserving sort is the Blakemore, a variety adapted to the region from New Jersey to Georgia and west to southern California. For the ice-cream trade the Marshall and the Klondike are liked, though other kinds are used. Because of the low cost of production and the steady supply, the larger part of the berries for preserving and the ice-cream trade are packed in Oregon and Washington and are of the Marshall variety.

VARIETIES FOR SHIPPING

The following varieties when grown in regions to which they are adapted are among the best for shipping to distant markets: Blakemore, Klondike, Aroma, Clark, Missionary, Gandy, Chesapeake, Joe, Lupton, and Nich Ohmer. The Blakemore is a particularly good shipping sort. Although these sorts are firm in some sections, they may not be and often are not good shipping sorts in other sections. Therefore a grower who ships to distant markets should select varieties that have proved to be firm when grown in his locality and should not rely too much on the reported behavior of a variety in some section remote from his own.

VARIETIES FOR SEVERE WINTER CLIMATES

In the upper Mississippi Valley it is essential that very hardy sorts be selected. Lack of moisture, drying winds, and low temperatures in winter combine to make very trying conditions, and only a very few sorts succeed there. Of the commercial sorts, the Progressive, an everbearer, is considered the hardiest, the Dunlap next, and the Warfield next. Howard 17 and Mastodon are also hardy in some parts of this region. Minnehaha, Chaska, Duluth, and Easypicker, new varieties developed in Minnesota, seem particularly adapted to this region. The Dakota, though not considered a commercial variety, can be grown in parts of North Dakota and South Dakota where even the Progressive is not hardy.

In western Oregon the Corvallis and Redheart are more hardy than the Ettersburg 121.

FROST-RESISTANT VARIETIES

Of the standard varieties, the flowers of Howard 17 are much superior to those of other sorts in resistance to frost injury. Chesapeake and Parsons are reported as more resistant than some other sorts. Where frosts are usually serious, everbearing varieties are commonly grown instead of the ordinary spring-fruiting sorts.

DISEASE-RESISTANT VARIETIES³

The most serious fungous diseases affecting strawberry plants are Botrytis or gray mold and the various leaf spots. The Botrytis attacks the stem, calyx, and fruit in various stages of development. In rainy seasons the loss caused by this fungus is often serious, and in sections where such seasons occur frequently during the fruiting period those varieties should be selected which appear from wide observation to be least susceptible. Varieties believed to be more or less resistant are the Sample, Chesapeake, and Aroma, but under conditions especially favorable for the development of the disease their resistance is sometimes less pronounced.

There is a wide range of variation in the resistance of varieties to leaf spots, which occur wherever strawberries are grown. In semiarid regions the leaf spots do little damage. They often cause serious injury in the North, but are especially destructive in the

³ For further information see Farmers' Bulletin 1458, Strawberry Diseases.

Southern States. Varieties such as Glen Mary, Marshall, and Red-heart, which are susceptible to these diseases, are limited in their range to semiarid and northern regions. Some sorts, however, show marked resistance, among them the Chesapeake, Howard 17, Blake-more, Fairfax, and Dorsett.

In some sections of the United States and in certain seasons considerable damage to the foliage of the Gandy, Clark, and some other varieties is caused by mildew. It is of much less common occurrence, however, than either of the other diseases mentioned and is not of great importance, as a rule, on the more generally grown commercial sorts. The Nich Ohmer has replaced the Marshall to a considerable extent in California because it is more resistant to the "yellows", a virus disease.

INSECT-RESISTANT VARIETIES

Less is known of the relative susceptibility of strawberry varieties to the various insect pests than of their susceptibility to diseases of the foliage and fruit. It appears that the Chesapeake is more resistant than many sorts to attacks of the red spider. Varieties having imperfect flowers are known to be damaged very little by the strawberry weevil (*Anthonomus signatus* Say.), while in certain sections those having perfect flowers are often severely injured. Therefore, wherever the weevil does serious damage, growers sometimes plant imperfect varieties, with the perfect varieties least susceptible to injury by the weevil for pollinators. Among the perfect sorts badly injured by the weevil are the Heflin, Klondike, and Missionary. The Howard 17, Chesapeake, Aroma, and Mascot have sometimes been attacked to a less extent, while the Gandy seems to be less susceptible than many other sorts.

VARIETIES HAVING EXCEPTIONAL SIZE, FLAVOR, OR QUALITY OF FRUIT

Among the varieties having large showy fruit are the Fairfax, Dorsett, Catskill, Chesapeake, Blakemore, Joe, Lupton, Marshall, and Howard 17. The largest and most showy berries are produced by the Dorsett, Fairfax, Catskill, and Marshall under the hill system.

Many persons who cannot eat certain varieties of strawberries because of their high acidity can eat the milder flavored sorts without harm. The Fairfax and Southland are considered the best for such use, as they are very mild. Other mild-flavored sorts are the Marshall, Chesapeake, Belt, and Dorsett.

The quality of strawberry varieties is affected to a large extent by climate and local weather conditions. Furthermore, varieties that appeal to certain individuals as being of very high quality do not so appeal to others. Some like varieties with a very mild flavor, while others like those having a pronounced flavor and considerable acidity. Varieties vary greatly from season to season in the same section and often have higher dessert quality toward the end of the season than at the beginning. Moreover, a variety may have good dessert quality in one locality, but this quality may be poor in a section having a different climate. Thus, the Howard 17 is almost insipid in eastern North Carolina but often has high quality in New York and New England.

The Marshall, Dorsett, Fairfax, and Narcissa are among the varieties having the best dessert quality, and all are usually mild in flavor. Other varieties of high quality are the Belt, Chesapeake, Joe, and Dunlap. The Southland is the best in quality of the southern varieties.

EARLY, MIDSEASON, AND LATE VARIETIES

It is difficult to classify varieties according to their season of ripening because this period is influenced by local weather conditions, climate, exposure, soil, and the treatment given the plantation. Thus the Missionary, which is an early variety in Maryland, may begin to bear in Florida in December and continue until May and June under favorable conditions. The Nick Ohmer and Marshall mature their fruit in June in Massachusetts, but on the coast of California they begin in April and fruit continuously until November. Weather conditions also affect the length of the ripening season, and a variety that ordinarily ripens its crop in a short period may, in cool weather, have a season extending over several weeks. Varieties are affected differently by cool weather; some that are early and ripen very rapidly in warm weather may be late and ripen very slowly when the weather is cool. Exposure, type of soil, and cultural conditions also affect the ripening season of varieties. Any classification on the basis of the season of ripening, therefore, must be somewhat general, and the lists given in table 3 must be so interpreted.

TABLE 3.—*Varities listed according to season of ripening*

[Abbreviations: eb=Everbearer, ve=very early, em=early to midseason, ml=midseason to late vl=very late]

Early varieties	Midseason varieties	Late varieties
Blakemore (ve). Campbell (ve). Dorsett (ve). Dunlap (em). Excelsior (ve). Fairfax (em). Hefflin. Howard 17 (ve). Klondike. Progressive (ve, eb). Missionary (em). Narcissa (ve).	Aberdeen. Glen Mary. Marshall (em). Parsons (<i>Pocomoke, Gibson</i>). Redheart.	Aroma (ml). Belt (ml). Catskill (ml). Chesapeake. Gandy. Joe (ml). Late Stevens. Orem (vl). Nick Ohmer (ml). Pearl (vl). Sample.

EVERBEARING VARIETIES

In table 3 the Progressive is listed according to the season when it produces its spring crop. It also produces fruit in the summer and fall. The Mastodon has large berries and better runner production than the other everbearing sorts. Its fruit is not so good in dessert quality as that of Progressive. It also produces a crop during the summer and autumn. The Rockhill is as large as Mastodon, is firmer and much better in quality, but does not make runners freely. Several other everbearing sorts are in the trade but are not generally so desirable as those just mentioned. Among those grown to a slight extent are the Duluth and the Superb.

NEW VARIETIES

New sorts that are superior to standard ones are introduced occasionally, but most of the introductions are inferior. The number of new varieties that may be introduced can be better realized by reference to figure 9, which shows beds containing about 15,000 seedlings, each one potentially a distinct variety. The breeder on whose grounds the photograph was taken has raised from 10,000 to 25,000 seedlings annually for many years and tested hundreds under field conditions, but has introduced only a single variety. Other breeders in various parts of the United States are doing similar work. The best of the seedlings are introduced as new varieties, but on extended trial they may develop some weakness that makes them undesirable.



FIGURE 9.—Seed beds filled with seedling strawberry plants. The seed was planted the previous autumn and the beds covered with a straw mulch, which was removed early in the spring. On July 13, when the photograph was taken, about 15,000 seedlings had started, each one of which is potentially a distinct variety.

Growers, therefore, should test new varieties before planting them extensively.

When new varieties are tested they should be set by the side of standard sorts and receive similar treatment. If a variety shows itself very susceptible to leaf spot and other diseases it should usually be discarded after one crop is harvested; if it does not seem susceptible, the test should extend over 2 or 3 years, as some seasons are more favorable than others. Furthermore, even in favorable seasons some varieties do not show their true character the first year. A 3-year test, however, will generally indicate the probable value of any new sort.

RUNNING OUT

It is often asserted in certain sections that a strawberry variety may be very productive for a few years and then "run out," that is, become unproductive. Some sorts are said to run out quickly, in 2 or

3 years, others in about 7 years, while the best run out in about 14 years. A glance at the record of the leading varieties grown at present should help to correct this view.

The Klondike was originated about 1896 and introduced in 1901, while the Aroma appeared in 1889, the Dunlap in 1890, the Gandy in 1885, the Missionary about 1900, the Chesapeake in 1903, the Clark before 1880, the Joe before 1899, the Marshall in 1890, and the Sample in 1894. The Jucunda, a variety grown in Colorado, was introduced before 1860. The Wilson originated in 1851 and is still grown in some localities. It was at one time grown throughout the United States, but it has been replaced in most sections by varieties more resistant to disease and having larger, firmer berries with milder flavor. Since varieties having larger, firmer, and sweeter berries than the Wilson have been introduced the standards have risen and are continually rising. Unconsciously, old sorts are being judged by new standards, and although they do not seem to be as good as they once were, in reality probably no change has occurred.

Where the yields of certain varieties have decreased markedly within a comparatively few years, various reasons may be assigned. In the South Atlantic, Gulf, and Pacific Coast States, the bud nematode has been an important cause of failure. In nearly all sections fungous leaf spots, *Botrytis*, and, to a lesser extent, mildew have caused serious loss. In northern States the strawberry mite is often serious. New varieties may be comparatively free from these diseases at the time of their introduction, but after a few years may prove so susceptible that they cannot be grown profitably. Therefore, although yields from certain sorts may decrease after a few years, even on soils the fertility of which has been maintained, it is probable that some disease or insect factor can be assigned as the cause of the reduced yield. Virus or mosaic diseases have caused a decrease in yield on the Pacific coast and possibly in the Eastern States.

In selecting varieties to plant, those resistant to disease should be chosen, and as far as possible they should be selected from plantations relatively free from disease. If the fertility of the soil is maintained, if varieties that are very resistant to disease are set, and if reasonable care is exercised in propagation, no running out in the usual sense of the term is likely to occur.

CHARACTERIZATIONS OF THE MORE IMPORTANT VARIETIES

The following characterizations are intended to aid the prospective strawberry grower in his selection of sorts especially suited to his section and to the purpose for which he wishes to grow them. Only those varieties that are extensively grown in at least one section and promising new sorts that have been widely tested are listed here, and only those characteristics having a bearing on the commercial value of a variety are stated. By using these characterizations in connection with the list of varieties arranged according to States and sections in table 1, the prospective planter should be able to select desirable sorts for his conditions. The meaning of the terms used in describing the form of berries can be understood by reference to figure 10. Imperfect varieties have "imp." following their names. All others are perfect.

Aberdeen.—New Jersey origin, about 1900. Berry medium large, conic, regular, attractive, light red, seeds even and regular, white core, fairly soft, mild acid to acid, fair quality; midseason to late; flowers perfect; plants vigorous, make runners freely. Because of its productiveness and late season,

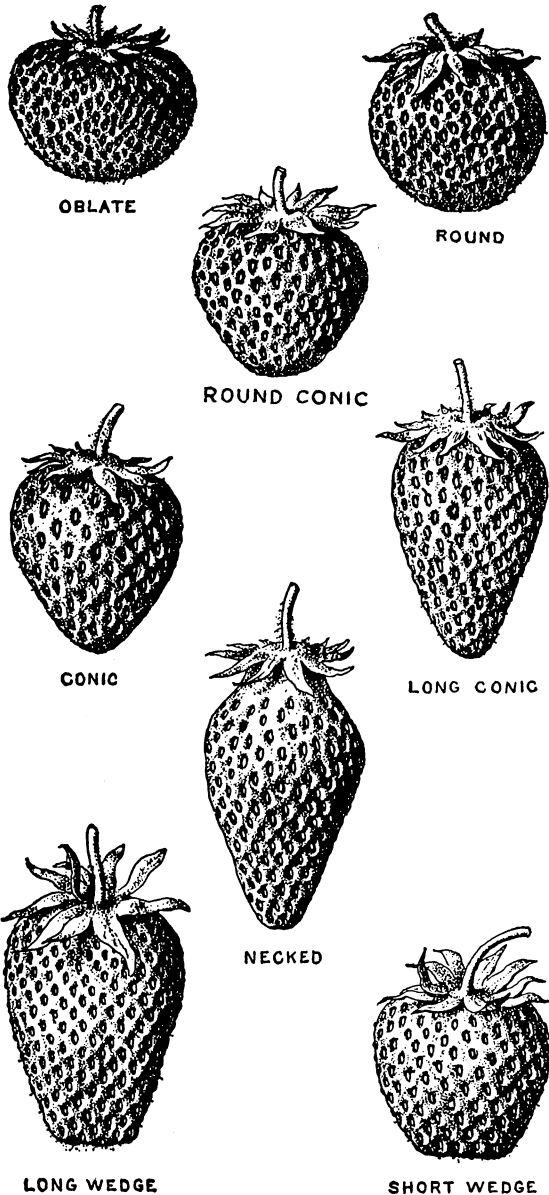


FIGURE 10.—Different forms of strawberries, illustrating certain terms used in describing the varieties. (Drawn by L. C. C. Krieger.)

it is a commercial sort in New Jersey and New England. It is too soft for distant shipment.

Aroma.—Kansas origin, 1889. Berry large, round conic to short wedge-shaped, firm, bright crimson on surface with light-red flesh, mild subacid, quality good;

midseason to late. Foliage very healthy; plants make runners freely. The Aroma is the leading variety in Kentucky, northern Arkansas, and southern Missouri, and is grown extensively in Illinois, Indiana, and Ohio. Its chief merits are the disease resistance of its foliage, the productiveness of the plants, and the firmness, dessert quality, and attractive appearance of the fruit. It is one of the best shipping varieties of the country and is well adapted to the general market requirements. It is best adapted to silt or clay soils.

Belt (*William Belt*).—Ohio origin, about 1888. Berry large, irregular round conic to wedge-shaped, soft, attractive dark crimson with dark-red flesh, mild subacid, quality very good to best; season medium late. Foliage only fairly healthy in New England, New York, and other parts of the North, and very susceptible to leaf-spot diseases in New Jersey and southward; plants make runners freely. This variety is grown for home use and local markets in New England and New York and to a slight extent in other northern regions. It is liked because of its productiveness and its attractive, dark-red, mild-flavored fruit of high quality. However, it should be planted on fertile soil and receive high cultivation. Fertilizers containing nitrogen should be applied in order to insure an abundant foliage in the spring to mature the crop.

Blakemore.—Maryland origin, 1923. Berry medium large, blunt conic, firm, bright, light red with light-red flesh, seeds yellow, flesh subacid, quality good; very early; flowers perfect; plants vigorous, make runners very freely. Its firmness, earliness, and bright light-red color which does not darken on holding make it a promising market sort. Its firmness, ease in capping (hulling), acidity, high pectin content, and light color make it especially desirable for preserving. It is recommended for the region from Georgia to New Jersey west to Arkansas and Missouri and southern California.

Catskill.—New York origin. Introduced in 1933. Berry large, round conic, not firm, very attractive, bright crimson with red flesh, mild subacid, quality good; midseason to late; foliage very healthy; plants make runners freely. Because of its very large size, very attractive appearance, productiveness, and healthy foliage, it is recommended for trial as a medium-late variety for home use and local market from Maryland and Massachusetts west to Missouri. The berries are rather soft and of good but not the highest dessert quality in Maryland.

Chesapeake.—Maryland origin, 1903. Berry large, round conic to short wedge-shaped, firm, bright crimson, with prominent seeds and light-red or whitish flesh, mild subacid, quality good to very good; late in season. Foliage remarkably healthy; plants make few runners except in rich, moist soil. The Chesapeake is the leading variety grown under irrigation in the northeastern United States. It is also raised extensively without irrigation in Maryland, Delaware, and New Jersey, and is desirable for home use and for market purposes in eastern Missouri and all the northern United States east of the Mississippi. It is liked because of its large, uniform, attractive fruit of excellent dessert and shipping quality and the remarkable freedom of its foliage from diseases and insects. Under irrigation it is one of the most productive of all varieties, and the fruit does not rot as badly as most other sorts.

Clark.—Oregon origin, introduced about 1880. Berries small to medium size, round to round conic, very firm in Oregon and Washington, dark crimson with dark-red flesh, brisk subacid to acid, quality good; midseason. Foliage subject to mildew. The Clark is grown only in the Pacific Northwest and is practically the only variety raised in the Hood River and White Salmon districts. It is liked because of its excellent shipping quality and attractive color and because it retains its shape and color well when canned. It is considered the best shipping and canning sort grown in the Northwest, and is recommended only for that region. It is not, however, a heavy producer. The color of its foliage under certain conditions suggests mosaic infection, which may be the cause of its low yields.

Dorsett.—Maryland origin, 1923. Berry large, blunt, long conic, medium firm, very attractive, bright red with red flesh; mild subacid, dessert quality excellent; early; foliage healthy; plants make runners very freely. Because of its high dessert quality, large size, attractiveness, and productiveness when the plants are not allowed to become too thick, it is recommended for trial wherever the Howard 17 is grown. It is not very firm but is not as soft as Howard 17, and it is not productive when the plants are allowed to mat too thickly. It is most productive when the runners formed late in the season are picked off.

Dunlap.—Illinois origin, 1890. Berry medium size, conic, not very firm, dark crimson with deep-red flesh, subacid, quality very good; season early to mid-

season. Foliage healthy in the North, somewhat susceptible to leaf spot in the Southern States; plants make runners very freely; very hardy and drought resistant. This variety is grown widely in northern Illinois, Wisconsin, Iowa, Minnesota, Nebraska, North Dakota, and South Dakota. It is also widely grown in all other parts of the Northern States east of the Rocky Mountains and does best on clay soil. The Dunlap is liked because the plants are very hardy and productive, the foliage very healthy, and the berries of very good dessert quality. They are not, however, very good for shipping and are grown chiefly for home use and local markets. It has been largely replaced by Howard 17 where that variety is hardy.

Ettersburg 121.—California origin, 1907. Berries small to medium, round, very firm, medium red, rather mild subacid, quality good to very good; midseason to late. Foliage small and subject to leaf spot in Eastern States; plants make runners quite freely. This variety is grown chiefly in western Oregon, where it is considered the best sort for canning. There it succeeds best on certain clay and silt soils. On sandy soils many of its flowers are sterile and it is unsatisfactory. In the Eastern States most of its flowers are sterile, and it is so unproductive that it is not grown. It is being replaced in Oregon in part by Corvallis and Redheart.

Fairfax.—Maryland origin, 1923. Berry large, wedge-shaped to short blunt conic, very firm, very attractive, bright deep red, flesh deep red, mild subacid, dessert quality excellent; medium early; foliage very healthy; plants make runners fairly freely. Because of its high dessert quality, large size, attractiveness, and productiveness it is recommended for trial wherever the Howard 17 is grown. It is very firm but because the color turns dark, like that of the Missionary and Marshall, it should be picked when it first ripens and marketed promptly. It does not make plants as freely as Dorsett, is much firmer, is milder in flavor, and is much darker than the Dorsett. It is especially productive when the runners formed late in the season are picked off.

Gandy.—New Jersey origin, 1885. Berry large, irregular round conic, firm, deep crimson with red flesh, brisk subacid, quality good; season late. Foliage more healthy, as a rule, than that of most sorts, yet somewhat susceptible to mildew, and sometimes attacked by leaf-spot diseases; plants make runners freely. The Gandy has been a leading variety and is still grown somewhat throughout the northern United States except in the colder parts of the Middle West. It was liked because of its large, attractive, deep-red, firm fruit, of excellent dessert quality, and because it ripens late, after the season of many others has ended. It does best on moist heavy clay soils. Except on heavy soils, however, it is not very productive, and in some cases it is somewhat susceptible to foliage diseases. The berries are apt to decrease in size if a field is fruited more than 1 year.

Glen Mary (partially imperfect).—Pennsylvania origin; introduced in 1896. Berry large, irregular round conic, rather soft, medium deep crimson with red flesh, often with white tips, subacid, quality good; midseason. Fruit stems too slender to hold fruit off the ground. Foliage susceptible to leaf spot; plants make runners freely; best adapted to heavy soils. The Glen Mary is grown in New York and New England and in some other sections in the northern United States. It is liked because it is productive, and because the fruit is of high dessert quality and deep red in color. The plants, however, must receive high culture in order to produce berries of good size. Because the foliage is very susceptible to leaf spot, it is grown very little south of New York on the Atlantic coast. Even in the New England States and New York growers consider it desirable to use large quantities of stable manure late in the autumn or nitrate of soda early in the spring in order to force a rapid spring growth of leaves; otherwise, the foliage may be so badly damaged by leaf spot that not enough remains to mature a crop. The blossoms are not entirely self-fertile, and some other variety, such as the Dunlap, should be planted with it to furnish pollen. The berries often have white tips when they are otherwise ripe and ready to pick.

Heffin.—North Carolina origin; introduced about 1902. Grown extensively in the Eastern Shore section of Virginia. Very early, berries light red, subacid, fair quality, but too soft and flesh color too light. Berries normally long conic, but early berries very irregular in shape.

Howard 17 (*Premier*).—Massachusetts origin; introduced as Howard 17 in 1918. Berry medium to large, long conic, fairly firm, red with red flesh, subacid, quality good; very early, with long season. Foliage very healthy; plants

generally make runners freely. It is one of the leading varieties in New England southward to Virginia and westward to Kansas and southern Minnesota. It is one of the best sorts for home use and local markets east of the Great Plains and north of Virginia and the Ohio River. It is liked because of its exceptionally healthy foliage and its productiveness. It does well on a wide range of soil types. The fruit is not firm enough to ship to distant markets. It has been replaced by Blakemore in Maryland and is being replaced in part by Dorsett and Fairfax in other regions because of their superior quality.

Joe (*Big Joe*).—New Jersey origin; introduced in 1899. Berry large, round conic, firm, dark crimson with red flesh, subacid, quality good to very good; midseason to late. Foliage healthy; plants make runners freely on good soil. This variety is widely grown in Maryland, New Jersey, Delaware, and Pennsylvania. It is also grown to a less extent in all parts of the northern United States except in parts of the Middle West having very severe winters. It is liked because of its large, attractive berries, which are very good shippers and because of its good dessert quality. The Joe is liked by many as well as the Chesapeake for intensive culture, and because it makes more plants than that variety it is sometimes more desirable. The Catskill should be tested by growers of Joe as being possibly better.

Klondike.—Louisiana origin, about 1896. Berry medium size, round or round conic (except in California, where it is necked), very firm, deep crimson to center, acid, quality fair to good; midseason. Foliage healthy; plants make runners freely. The Klondike has been grown almost exclusively in all parts of the South Atlantic and Gulf Coast States except Florida, in certain parts of North Carolina and Virginia, and in the Cullman district of Alabama. It is also grown extensively in southern California and in Arkansas and Tennessee. It is being replaced in part at least by Blakemore in all districts except those within 100 miles of the Gulf. It is liked because its foliage is resistant to leaf spot (though not to leaf scorch), and its fruit firm and deep crimson in color. It is one of the best shipping varieties and is especially adapted to market purposes. Because of its deep-red color and firm flesh it is well liked for barreling for the ice-cream trade and is one of the best varieties for this purpose. The hulls, however, do not separate easily.

Lupton.—New Jersey origin; introduced about 1915. Berry large, short wedge-shaped, variable, often double; firm, very showy; quality poor; midseason. Foliage resembles the Chesapeake, but is susceptible to leaf spot. Plants make runners freely. Best adapted to low ground like that on which the Gandy does best. The Lupton is being grown somewhat in southern New Jersey, Delaware, and Maryland. It is liked because of its remarkably handsome fruit, which has good shipping quality; on the Philadelphia and Boston markets it has commanded fancy prices. The berries, however, have coarse, dry flesh which makes them low in dessert quality.

Marshall (*Banner, Oregon*).—Massachusetts origin, 1890. Berry large, irregular round conic to conic, soft, deep crimson with dark-red flesh, subacid, quality best; early to midseason. Foliage only fairly healthy in New England and New York, but too susceptible to leaf spot farther south to be desirable; plants make runners rather freely; especially adapted to heavy soils. The Marshall has been the standard of excellence in dessert quality and in the East is grown chiefly because of this and because, under the most intensive garden culture, it produces large crops of handsome berries. It is necessary even in New England and New York to grow it on rich soil and to fertilize it heavily in the autumn with stable manure or in the spring with nitrate of soda in order to force a rapid growth of foliage; otherwise, the leaf-spot diseases frequently injure it so severely that the fruit does not develop. It is the leading variety in California, Oregon, and Washington. On the coast of California it fruits throughout the summer and is exceedingly productive. In Oregon and Washington it is grown extensively for the preserving trade. It is equalled in dessert quality by the new Narcissa, Dorsett, and Fairfax.

Mastodon.—Indiana origin, 1917; introduced in 1924. Berry large to very large; round conic, with sides sometimes slightly furrowed; medium dark scarlet red, very attractive; flesh firm, subacid, fair quality; seeds bright yellow. Plant develops a number of crowns and is a good plant maker for an everbearing variety. It is hardy and productive in all strawberry regions where there is enough rainfall to develop the berries. It has taken the place of Progressive as the leading everbearing variety in the Eastern States. It is

too soft for shipment during rainy periods and is not of high quality. In Minnesota, Oregon, and Iowa the Rockhill is superior.

Missionary.—Virginia origin, about 1900. Berry medium size to large, conic, soft to very firm according to the section in which it is grown, dark crimson with dark-red flesh, acid, quality fair to good; early to midseason. Foliage very resistant to leaf spot; makes runners freely. This variety is the standard sort for Florida and is grown extensively in the eastern part of North Carolina and in the Norfolk district of Virginia. The berry, however, is softer than the Klondike in North Carolina and Virginia, but is more productive. In Florida the berry is very firm, and excellent for shipping. It begins to ripen there in December or January and continues until April at least. Because of its long ripening season, its firm, attractive fruit, and the freedom of its foliage from leaf spot, it is considered more desirable than any other sort for that State. The Blakemore may replace it except in Florida.

Narcissa.—Maryland origin, 1923. Berry medium size, blunt conic, medium firm, very uniform and attractive, bright crimson, red flesh, mild subacid, quality excellent; season very early; foliage healthy; plants make runners very freely. Because of its attractive berries of high dessert quality, it is recommended as a very early local market sort for the Pacific Northwest and for trial in the Northeastern States if the runners are restricted in late summer. It is only fairly firm and makes runners so freely that the plants crowd each other under the matted-row system so that they become unproductive.

Oregon.—All in the trade identical with Marshall.

Parsons (*Parsons Beauty*, *Gibson*, *Pocomoke*).—Maryland origin, about 1890. Berry medium to large, irregular conic to wedge-shaped, soft, bright crimson with red flesh, brisk, subacid, quality fair to good; midseason. Foliage, somewhat susceptible to leaf spot; plants make runners freely. The Parsons is grown chiefly in western Michigan. It is usually advantageous to use stable manure late in the autumn on plantations of this variety in order to induce a vigorous foliage growth early in the spring. (Part of the plantings under the names of Parsons and Pocomoke may be the latter variety.)

Premier.—Introduced in 1915. A synonym of Howard 17. See the description of that variety.

Progressive (*Champion*).—Iowa origin, 1908. Berry small to medium size, conic, soft to moderately firm, dark crimson with dark-red flesh, subacid, quality good to very good; an everbearer, season early, fruiting until hard frosts in autumn. Foliage healthy and one of the most resistant of all to leaf-spot diseases; plants make runners freely on rich ground. The Progressive was the most widely grown of the everbearing strawberries until after the Mastodon was introduced. It is liked because of its hardness, its resistance to leaf-spot diseases, its excellent dark-red fruit, and also because if planted early in the spring it yields a considerable quantity of fruit the same year. It is especially adapted to home gardens and intensive culture on rich soil amply supplied with moisture. It is adapted to regions north of those in which the Klondike and Aroma succeed, but has not been found adapted to the South.

Sample (imp.).—Massachusetts origin, 1894. Berry large, conic to long conic, soft to medium firm, dark crimson with red flesh, subacid, quality good; season late. Foliage usually healthy in the North, affected by leaf spot in southern New Jersey and southward; plants make runners freely. The Sample is grown in New England and New York and to some extent in Pennsylvania and Michigan. It is liked because of its productiveness and its large, uniform, attractive, dark-red fruit. The berries, however, are somewhat soft for shipping; it is especially adapted to home gardens and the local market. It is commonly pollinated with Dunlap and other varieties of the same season, but has been largely replaced by Howard 17.

Southland.—Maryland origin, 1920. Berry large, short blunt conic; tender skin, firm flesh; very attractive; glossy, bright crimson, red flesh; mild subacid; quality very good; season early; foliage very healthy, large, glossy, nearest evergreen in the South of any variety; plants make runners fairly freely. Because of its very attractive berries of high dessert quality it is recommended for home gardens in the southern parts of the States north of Florida. Its skin is too tender for market use, and it is more subject to frost injury than most eastern varieties.

Wilson.—New York origin, 1851. Berry medium size, round conic, soft to firm, dark crimson, with dark-red flesh, brisk subacid flavor, quality good; medium early. Foliage fairly healthy in New York; plants make runners freely. The Wilson was formerly grown extensively in nearly all parts of the United States, but is now planted very little except in Oregon. It is liked because of its extreme productiveness on fertile soils and its dark-red acid fruit of good quality, which is used almost entirely for canning. It should be grown on fertile soils containing a good supply of nitrogen, which will force a vigorous growth of the foliage.

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